

too, American writers are dismissed without notice, save a passing allusion to F. A. Walker. Carey's theories are occasionally referred to in connection with other names, but no specific account is given of them, nor are other American authors, orthodox or heterodox, better treated. Even a general history ought not, one would think, to have omitted notice of such writers as Lord Lauderdale (whose treatment of Demand and of the Functions of Capital has not received the attention it deserves), R. Jones (whose essay on the Early English Economists might also have been noted in its proper place), Jacob, Stirling (the translator of Bastiat and author of an excellent but well-nigh forgotten work, "Philosophy of Commerce"), Bernhardt (the author of a remarkable treatise on Large and Small Landed Properties), Hübner, H. Thornton, Baumstark, Skarbek, Cieskowski, Saint-Chamans, Esmenard de Mazet, Louis Say, Schön, Canard, and Cazeaux. Dureau de la Malle's work might have been noted in connection with the political economy of the Romans, and De Tracy's name should not have passed without reference to his commentary on Montesquieu.

The translation appears to us generally excellent, and the translator, who is evidently well acquainted with the subject, deserves much credit for the clear and concise English into which she has rendered Prof. Cossa's work.

OUR BOOK SHELF

Avis préliminaire d'une nouvelle Classification de la Famille des Dytiscidae. Par D. Sharp. (Extrait des Comptes rendus de la Société Entomologique de Belgique, Séance du 4 septembre, 1880.)

DR. SHARP is well known to have been long occupied on a work on the water-beetles of the world (at any rate on those of this particular family). The author announces it as ready for the press, and has forwarded to the Belgian Entomological Society a sketch of his ideas of the limits of the family and its classification, from which we learn that about 80 genera are recognised. One of the most important characters, as separating true *Dytiscidae* from *Carabidae* and from all other *Coleoptera*, appears to consist of the condition of the metathoracic episternum in connection with the intermediate cotyloid cavities. The family as a whole is divided into two great divisions, termed "*fragmentati*" and "*complicati*," the latter being headed by the anomalous genus *Amphizoa*, the position assigned to which will perhaps not find universal favour. No one can doubt that the book, when it appears, will mark an era in this department of entomology. It is a great pity therefore that Dr. Sharp should throw himself open to the shafts of ridicule in his choice of terms wherewith to designate some of his new genera. We need only allude here to such terms as *Huxelhydrus* (presumably a misprint for *Huxleyhydrus*), *Darwinhydrus*, and *Tyndalhydrus*!!! We all honour the names that form the prefixes, and fail to realise the watery connection suggested.

Aid to the Identification of Insects. Edited by Charles Owen Waterhouse. Lithographs by Edwin Wilson. Small 4to, Part I. (London: E. W. Janson, 35, Little Russell Street, W.C.)

MR. WATERHOUSE, whose duties in the zoological department of the British Museum have probably continually caused him to feel the want of some such work as that which he now commences under the above title, has conceived the idea of issuing, at intervals of a month or six weeks, a series of hand-coloured drawings of insects of all orders not previously figured. Every working naturalist knows that a good pictorial representation con-

veys a more accurate and ready perception of a species than the most elaborate verbal description; and we can imagine no more ready way of widely disseminating a knowledge of the arcana of science than this. Each part is to contain eight or nine plates, each representing a single species, with its generic and specific names, the name of its describer, and a reference to its locality and place of description. The plates can be classified on the completion of a volume (twelve parts), when a title-page and index will be issued.

The first part, just issued, contains some well-executed figures of *Coleoptera*, *Hemiptera*, and *Lepidoptera*. The whole idea is unconsciously a repetition of Prof. McCoy's "Prodromus of the Zoology of Victoria," but with no Government money to back it up.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Geological Climates

I HAVE read with much interest Mr. Starkie Gardner's letter in NATURE, vol. xiii. p. 53.

It is not necessary for me to discuss the question whether I am right in requiring an increase of 20° F. mean annual temperature at Bournemouth in Eocene times, or whether he is right in demanding an increase of only 14° F. to 15°, for I am able to show that the one increase is as impossible as the other, on the principles held by Lyell and his followers.

Mr. Starkie Gardner's ideas on the subject of oceanic circulation and its effects upon climate are expressed in the following words:—

"The general cooling effect of incessant oceanic circulation between the North Pole and the Tropics is, I think, scarcely taken into sufficient account; and although it may be contended that conversely the northerly flow of the Gulf Stream mitigates climate, I think that its action in Europe is chiefly in fending off the ice-laden currents from our coasts," &c., &c.

This statement, to my mind, involves so complete a misapprehension not only of the physical causes of oceanic circulation, but also of the whole problem of geological climate, that I shall ask your permission to lay down a few elementary propositions on the subject, which are capable of demonstration.

1. The Gulf Stream of the North Atlantic, so far from acting the part of a policeman in "fending off" imaginary cold water streams from the Polar regions, is the cause of their existence. If there were no Gulf Stream there could be no Labrador current of cold water running south. The same statement is true of the Kuro-Siwo of the North Pacific, of the Brazilian current of the South Atlantic, and of the Mozambique current of the Indian Ocean.

2. If the globe were covered with water, or in the condition of an archipelago pretty uniformly distributed, there would be no exchange of currents between the Tropics and the Poles, and consequently no effect upon climate. Within the Tropics there would be a broad, slow current of warm water moving from east to west, and producing no effect upon climate. In the temperate zones there would be in the northern hemisphere a feeble interchange of south-westerly and north-easterly currents, and in the southern hemisphere a similar interchange of north-westerly and south-easterly currents, both incapable of affecting climate to any sensible degree.

3. If a north and south barrier be constructed to the westward of a locality like the West of Europe; such a barrier as North and South America affords, a gulf stream is, at once, formed, and a corresponding Labrador current running in the opposite direction.¹ The effect of the Gulf Stream is to raise the temperature of the West of Europe to its maximum, and the effect of the Labrador current is to depress the temperature of the east coast of North America to its minimum.

4. It is impossible to suggest any rearrangement of land and water which shall sensibly raise the temperature of the West of

¹ The earth's rotation compels the Gulf Stream to impinge on the west coast of Europe, and the Polar current on the east coast of North America.

Europe, or sensibly depress the temperature of the east of North America.

Mr. Gardner makes the following hypothetical redistribution of land and water :—

"Supposing, as all evidence tends to prove,¹ that Northern Europe and America were connected by continuous land in Eocene time, would not the mere fact of shutting off the Arctic seas cause a general and perhaps sufficient rise of temperature?"

My answer to this is that such an arrangement of land and water in the North Atlantic would raise considerably the present *minimum* temperature of the east coast of North America, but would produce little or no effect in raising the already *maximum* temperature of West Europe, which already receives the full benefit of the Gulf Stream, and suffers none of the injuries of the Labrador current.

It seems to me not possible to raise the mean annual temperature of Bournemouth 15° F. or 20° F. without supposing an *increased Gulf Stream*; in other words, an *increased sun-heat*, which is contrary to the ideas of Lyell and his followers.

I must again ask Mr. Duncan to name the *species* of bamboo that flourishes so luxuriantly at Cooper's Hill under the disadvantageous conditions he has so well described.

If he decline to do so I have no other remedy than to go to the Indian Engineering College on my next visit to London, and inspect and report on the bamboo myself.

Trin. Coll. Dub., November 23

SAML. HAUGHTON

"Sulphuric Acid and Alkali"

MR. MACTEAR informs me that the statements contained in my review of Prof. Lunge's second volume, which appeared in your columns last week, require amendment, and I beg, in justice to Mr. Mactear, to make the following remarks :—

1. It appears that the direct object of Mr. Mactear's process is to reduce the amount of limestone to the least possible amount. Hence the words "in excess of that usually worked" are to be omitted in the sentence referring to this subject.

2. With regard to the statement that many thousands of pounds have been gained in a single works by the adoption of Mr. Mactear's process, that gentleman has placed in my hands the proof that this fact is correct.

There remains however no doubt that, in the Lancashire district at least, the liming process is not now so generally adopted as Dr. Lunge implies; but this may be explained by the fact that Mactear's process greatly reduces the quantity of caustic soda, and this does not suit the Lancashire plan of working.

H. E. ROSCOE

A General Theorem in Kinematics

PROF. MINCHIN has been anticipated in his discovery of the theorem on uniplanar motion given in NATURE, vol. xxiii. p. 62. It was published some six years ago by Prof. W. Schell of the Polytechnikum, Karlsruhe, in the *Zeitschrift für Mathematik und Physik*, xix. 3. The paper containing it is entitled "Ueber den Beschleunigungszustand des ebenen unveränderlichen, in der Ebene beweglichen Systems," and commences at p. 185. The two parts of the theorem will be found in leaded type at pp. 190 and 192. The paper (which is an admirable specimen of clear writing) is purely kinematical, and treats only of motion *in plano*. The dynamical consequences pointed out by Prof. Minchin are accordingly not to be found in it; nor the analogous theorem for the general motion of a rigid body obtained by Prof. Wolstenholme. The following quaternion proof of the latter theorem may interest some of your readers.

The velocity $\dot{\rho}$ of the particle at vector distance ρ from a fixed origin is—

$$\dot{\rho} = a + V\beta\rho,$$

a being the velocity at the origin, and β the angular velocity.

The acceleration is therefore—

$$\ddot{\rho} = \dot{a} + V\beta\dot{\rho} + V\beta(a + V\beta\rho),$$

and will be zero for one definite value of ρ .

Taking the point of no acceleration for origin, the constant terms in the expression for the acceleration must vanish, and the expression will be reduced to—

$$\ddot{\rho} = V\beta\dot{\rho} + V\beta V\beta\rho,$$

which is identical with Prof. Wolstenholme's result.

Malone Road, Belfast, November 22

J. D. EVERETT

Phosphorescent Centipedes

ON September 28 last I was walking in my garden here at eight o'clock in the evening with a friend, when we were

¹ I entirely deny this, but will not now turn aside from my present purpose to discuss it.

simultaneously attracted by a bright light about twenty paces in front of us. The light was so bright that in the distance it looked like moonlight through the trees; and had the moon been shining we should probably not again have thought about the light until we came upon it. But it was a dark night, though warm and even sultry, and still. The light was so bright that, taking a letter out of my pocket, I could read it. It resembled an electric light, and proceeded from the bodies of two centipedes and their two trails. The centipedes were about four inches apart. The light illumined the entire body of the animal, and seemed to increase its diameter three times. It flashed along both sides of the creature in sections; there being about six sections from head to tail, between which the light played. The light behaved precisely like the electric light, moving as it were perpetually in two streams, one on each side, and yet lighting up the whole body. In the trail there was no movement, but light only. The trail extended 1½ foot from each centipede over the grass and the gravel-walk, and it had the appearance of illumined mucus.

Having observed these creatures for several minutes, I picked one of them up and lodged it in a box which had been procured from the house, for further observation. On touching the centipede the light in both animals, as well as in both trails, was instantly extinguished. Later in the evening we found another centipede, and this also emitted light in the same manner, both from body and trail as I have described. My gardener then informed me that he had observed these creatures during the previous three or four evenings, both in the garden and in the stableyard.

On the following day I took the centipede to Prof. Flower, who, with the assistance of the authorities of the British Museum, has identified the species as *Geophilus subterraneus*.

The published descriptions of the luminous properties of the British centipedes differ considerably from what I observed in this instance.

The best, so far as I know, is given in Shaw's "General Zoology," vol. vi. After describing the animal, it proceeds thus: "It is possessed of a high degree of phosphoric splendour, which, however, seems to be only excited when the animal is pressed or suddenly disturbed, when it diffuses a beautiful smaragdine light, so powerful as not to be obliterated by the light of two candles on the same table."

I may observe that I was never able to induce my centipede to shine whilst in captivity. It may also be worthy of note that the atmosphere was exceptionally dry and the barometer remarkably high at the time of the observation.

B. E. BRODHURST

Grange Court, Chigwell, November 22

The Yang-tse, the Yellow River, and the Pei-ho.

ALTHOUGH the conclusions at which Dr. Woeikof has arrived (NATURE, vol. xxiii. p. 9) with regard to my estimations of the discharge of water and sediment of the Yang-tse and Pei-ho may militate against their being accepted as generally typical of these two rivers, I would urge that another series of observations would be of more service in either correcting or in corroborating my estimations.

In the case of the Yang-tse it will have been seen that, according to the estimate of Capt. Blakiston at I-chang and of my own at Hankow—500,000 and 650,000 cubic feet of water per second respectively,—this river increases its discharge by 150,000 cubic feet in the 360 miles that intervene between these two places of observation. In this portion of its course the Yang-tse not only receives the waters of the Han, but is also the recipient of those of the Tung-ting Lake; and the increase it receives from these two important tributaries—an amount exceeding the water-discharge of the Nile²—is not such as would support the conclusion that my estimate for the Yang-tse at Hankow is under the usual average.

My observations on the Pei-ho, referring as they do to only a portion of the year, are more open to correction; and a series of observations throughout the entire twelve months are certainly to be preferred.

In conclusion I may state that, although my various estimations are open to criticism, my object will have been gained if, by inviting further inquiry into the hydrological features of the great river system of China, an accurate knowledge of them is obtained.

H. B. GUPPY

² 130,000 cubic feet per second.